

CLAIMS:

I claim:

1. A system, adaptable for performing presbyopic correction in which a portion of the corneal sclera tissue is removed by steps of:

(a) selecting a laser beam having a predetermined wavelength;

(b) selecting a beam spot controller mechanism, said beam spot controller to reduce and focus said laser beam to a fiber delivery unit;

(c) controlling the said fiber delivery unit to deliver said laser beam in a said predetermined pattern onto a plurality of positions on the corneal surface to remove portion of the sclera tissue outside the limbus area, whereby a presbyopic patient's vision is corrected to see near and far by increasing the accommodation of the lens.

2. A system as claimed in claim 1, wherein said laser beam is an ultraviolet laser having a wavelength range of about (0.15 - 0.36) microns and a pulse duration less than about 200 nanoseconds.

3. A system as claimed in claim 1, wherein said laser beam is an infrared laser having a wavelength range of about (1.4 - 3.2) microns.

4. A system as claimed in claim 2, wherein infrared laser is an optically pumped Erbium:YAG laser having a wavelength of about 2.9 microns.

5. A system as claimed in claim 1, wherein said laser beam is an ArF excimer laser having a wavelength of 193 nm.

6. A system as claimed in claim 1, wherein said laser beam is a XeCl excimer laser having a wavelength of 308 nm.

7. A system as claimed in claim 1, wherein said laser beam is a solid state diode laser having a wavelength range of about (0.95 - 2.1) microns.

8. A system as claimed in claim 1, in which said beam spot controller consists of at least one focusing spherical lens to couple the said laser beam to the said fiber delivery unit.

9. A system as claimed in claim 1, wherein said fiber delivery unit consists of an optical fiber having a length of about (0.5 - 1.5) meter and core diameter of about (0.2 - 0.8) mm and a hand piece connected to a fiber tip.

1 10. The apparatus of claim 9, wherein said fiber delivery unit is substantially
2 transparent to the wavelength of the said laser beam.

3 11. The apparatus of claim 9, wherein said fiber tip is made of a similar material as
4 that of the fiber and is made in one of the following shapes to focus the said laser beam onto
5 the treated sclera area of the eye: conical, spherical, 90-degree reflecting angle and flat end.

6 12. The apparatus of claim 9, wherein said fiber tip focuses the said laser beam onto
7 the treated area of the eye at a spot size of about (0.1 - 0.5) mm in diameter.

8 13. The apparatus of claim 9, wherein said fiber tip is made in a cylinder shape to
9 focus the said laser beam onto the treated area of the eye at a line shape having a dimension of
10 about (0.1 - 0.4) in width and (0.5 - 4.0) mm in length.

11 14. The apparatus of claim 9, wherein said fiber tip is operated in a contact-mode to
12 ablate the sclera tissue to a depth of about (300 - 800) microns.

13 15. The apparatus of claim 9, wherein said fiber tip is operated in a non-contact mode
14 to ablate the sclera tissue to a depth of about (300 - 800) microns.

15 16. The apparatus of claim 1, wherein said fiber delivery unit is controlled by the
16 surgeon to perform a predetermined patterns outside the limbus of the cornea by manually
17 moving the fiber tip in the radial direction of the cornea.

18 17. A system as claimed in claim 1, wherein said fiber delivery unit is attached to a
19 scanning device to perform said predetermined patterns outside the limbus of the cornea and
20 scan said laser beam along the radial direction of the cornea.

21 18. A system as claimed in claim 1, wherein said predetermined patterns outside the
22 limbus of the cornea defined by the area between two circles having radius of about 5.0 mm
23 and 9.0 mm, respectively.

24 19. A system as claimed in claim 1, wherein said predetermined pattern includes at
25 least 3 radial lines around the area outside the corneal limbus.

26 20. A system as claimed in claim 1, wherein said predetermined pattern includes at
27 least two rings formed by 8 circular spots having a diameter of about (0.2 - 0.5) mm around
28 the area outside the corneal limbus.

29 21. A system as claimed in claim 1, wherein said sclera tissue is removed by said
30 laser beam after the cornea conjunctiva is open.

31 22. A system as claimed in claim 1, wherein said sclera tissue is removed by said
32 laser beam without opening the cornea conjunctiva.

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